THE EFFECT OF MARKET ORIENTATION ON NEW PRODUCT PERFORMANCE, THE MODERATING EFFECT OF SUPPLIER INVOLVEMENT, AND THE MEDIATING ROLE OF PROFICIENCY IN NEW PRODUCT DEVELOPMENT

By

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ABBREVIATIONS

BOI	Board of Investment
EEI	Electrical and Electronics Institute
GDP	Gross Domestic Product
HDD	Hard Disk Drives
IC	Integrated Circuits
IMD	International Institute for Management Development
IPRs	Intellectual Property Rights
MO	Market Orientation
NPD	New Product Development
R&D	Research and Development
SIT	Science and Technology
UNCTAD	United Nations Conference on Trade and Development

KESAN ORIENTASI PASARAN KE ATAS PRESTASI KELUARAN BAHARU,KESAN MENYEDERHANA PENGLIBATAN PEMBEKAL DAN PERANAN PERANTARA KECEKAPAN PEMBANGUNAN KELUARAN BAHARU

ABSTRAK

Kejayaan keluaran baharu sangat penting kepada keunggulan organisasi dalam persekitaran yang pantas berubah. Tujuan kajian ini ialah untuk menyiasat kesan tiga dimensi orientasi pasaran, khususnya, penjanaan perisikan pasaran, penyebaran perisikan pasaran, dan daya gerak balas firma kepada perisikan pasaran ke atas prestasi keluaran baharu dalam pasaran. Kecekapan pembangunan keluaran baharu telah dianjurkan sebagai satu pemboleh ubah perantaraan, manakala penglibatan pembekal telah dianggap sebagai satu pemboleh ubah penyederhana ke atas perhubungan di antara orientasi pasaran (MO) dan kecekapan pembangunan keluaran baharu (NPD). Jawapan kepada instrumen tinjauan berstruktur telah diperoleh daripada personel daripada jabatan pemasaran dan jabatan teknikal yang mempunyai pengalaman dalam pembangunan keluaran baharu. Sejumlah 103 buah firma elektronik dan elektrik telah terlibat dengan kajian ini. Dapatan kajian ini menunjukkan bahawa daya gerak balas perisikan pasaran dan penyebarannya adalah signifikan dari segi statistik, dan memberikan kesan yang positif ke atas prestasi keluaran baharu. Seterusnya penyebaran perisikan pasaran merupakan penentu utama kepada kecekapan pada kelima-lima tahap NPD: pembangunan ide dan penapisan, analisis pasaran dan peluang perniagaan, pembangunan teknikal, pengujian keluaran, dan pengkomersialan keluaran. Manakala penjanaan perisikan pasaran mempunyai perkaitan yang positif dengan kecekapan pembangunan teknikal

dan kecekapan pengkomersialan keluaran, daya gerak balas kepada perisikan pasaran pula didapati mempunyai perhubungan yang positif dengan tahap-tahap awal NPD: pembangunan idea dan penapisan permulaan, dan analisis pasaran. Tentang analisis pengantaraan yang telah dijalankan, kajian mendapati bahawa hanya kecekapan pada tahap-tahap awal NPD sahaja, iaitu, pembangunan idea dan penapisan, dan kecekapan analisis pasaran mempunyai kesan pengantaraan ke atas perhubungan di antara penyebaran perisikan pasaran dan daya gerak balas kepada perisikan pasaran ke atas prestasi keluaran baharu. Kajian ini juga memperoleh bukti untuk menyokong kesan menyederhana penglibatan pembekal ke atas perhubungan di antara daya gerak balas kepada perisikan pasaran dan kecekapan pembangunan idea dan penapisan, analisis pasaran, dan pembangunan teknikal. Kajian telah mengesahkan lagi kepentingan menggunakan orientasi pasaran bagi melestarikan prestasi organisasi, khususnya apabila membangunkan dan melancarkan sesuatu keluaran baharu.

THE EFFECT OF MARKET ORIENTATION ON NEW PRODUCT PERFORMANCE, THE MODERATING EFFECT OF SUPPLIER INVOLVEMENT, AND THE MEDIATING ROLE OF PROFICIENCY IN NEW PRODUCT DEVELOPMENT

ABSTRACT

New product success is important for organizational survival in rapidly changing environments. The aims of this study is to investigate the impact of three dimensions of market orientation (MO), namely generation of market intelligence, dissemination and responsiveness on the success of new product in the marketplace. The proficiency of new product development (NPD) is posited as a mediator variable, while supplier involvement is treated as a moderating variable on the relationship between MO and proficiency of NPD. Responses to a structure survey instrument were solicited from marketing as well as technical personnel who have had experience in new product development. A total of 103 electronics and electrical firms participated in this study. The findings showed that responsiveness to market intelligence and dissemination of market intelligence are statistically significant and have positive effect on new product performance. Further, dissemination of market intelligence is the key determinant to the proficiency of all the five stages in NPD - idea development and initial screening; market analysis; technical development; product testing; and product commercialization. While the generation of market intelligence is positively associated with the proficiency in technical development and proficiency in product commercialization, responsiveness to market intelligence is found to be positively associated with the early stages of NPD - idea development & initial screening and market analysis. As to the mediation analysis performed, the study found that only proficiency in early stages of NPD, that are idea development

and screening, and proficiency in market analysis do have mediating effects on the relationship between dissemination of market intelligence and responsiveness to market intelligence on new product performance. This study also provides evidence to support the moderating effect of supplier involvement on the relationship between responsiveness to market intelligence and proficiency in idea development and screening, market analysis, and technical development. This study reaffirms the importance of adopting market orientation in sustaining organizational performance, in particular when developing and launching new product.

CHAPTER 1

INTRODUCTION

This chapter begins by providing the background of the study. This is then followed by a brief discussion of the gap of the study. The next section describes problem statement, the purpose of the study, the research objectives and the research questions of the study. This is the followed by a presentation of the significance and scope of the study. Finally, the chapter ends with a list of definitions of the key terms which will be used in this study.

1.1 Background of the Study

New products are the lifeblood of an organization. Their success in the market will ensure future sales and company growth (Kok, Hillebrand, & Biemans, 2003). Thus, new product development is considered as the best mechanism for gaining competitive advantage (Ettlie, 2006). New product development (NPD) can be a critical business process which would enable the firm to increase diversity and product mix especially in the international market, and to reduce a product life-cycle (Rozenfeld & Tahara , 2009). However, the rapidly changing customer needs, technological innovation, shorter product life cycle, high costs incurred in R&D and intense competition in the market, will cause NPD to be highly complex and dynamic (Beverland, 2006).

In a dynamic market, successful new products have focused on market oriented behaviour (Kok, Hillebrand, & Biemans, 2003; Kok & Biemans, 2009; Li, Liu & Zhao, 2006). The importance of market orientation as an antecedent of product innovation behaviours, activities and new product performances have been studied by several researchers (Atuahene–Gima, 1996; Augusto & Coelho, 2009; Baker & Sinkular, 2005;

Cooper, 1979; Gotteland, & Boulé, 2006; Im & Workman, 2004; Langerak, Hultink & Robben, 2004; Montoya-Weiss & Calantone 1994). However, market orientation is concerned about learning, which includes developing an understanding of the market, and using the knowledge for marketing actions (Kok, Hillebrand & Biemans., 2002). Many previous studies have conceptualized market orientation as information processing activities (Atuahene–Gima, 1996; Biemans & Harmsen 1995; Day, 1994; Kohli & Jaworski, 1990; Kok et al., 2002; Matsuno & Mentzer, 2000; Ruekert, 1992) and these studies viewed development of new products as based on the organization's information processing that combines the generation of market information, the dissemination of the information across departments, and responsiveness of various departments (Baker & Sinkula, 2005; Biemans & Harmsen, 1995; Kok et al., 2002, 2010). Baker and Sinkula (2005) found that 94% of the empirical studies that examined the effect of market orientation on new product performance reported a significant positive relationship. This would mean that there should be some important factors that link market orientation and new product performance.

NPD process or stage begins from idea development stage to product commercialization stage. At each stage of the development process, a large amount of knowledge and skill input is needed to create new product. These include inputs such as market insight, product concept, product design, function features, source, and application of component and technology, inner engineering design, system combination, assembling skill, process design and improvement, quality control, product function test, and so forth, if an effective NPD were to be achieved. A quality of well executed developmental activities in NPD is considered as the heart of the product development process (Song & Noh, 2006). A substantial body of literature has addressed the importance of proficiency in NPD process as a key driver in new product

development performance (Cooper, 1994; Edgett, 1996; Montoya–Weiss & Calantone, 1994; Song & Noh, 2006). NPD process may deal with market uncertainty and technology uncertainty that will affect the quality of the NPD process (Nadia & Thomson, 2010). Market orientation through market information processing (generation, dissemination, and responsiveness to market intelligence) helps firms to reduce uncertainty and facilitate effective NPD (Hart et al., 1999).

To date, there is still a lack of studies that examine the link between individual components of market orientation with new product performance through the proficiency of NPD. On the role of supplier involvement, a lot of literature has addressed the importance of their involvement in the NPD in improving the NPD process such as in reducing cost, shortening cycle time, new product development time, and enhancing quality improvement (Bonaccorsi & Lipparini, 1994; Chung & Kim, 2003; Clark, 1989; Fujimoto, Ianstiti & Clark., 1996; Martin, Mitchell & Swaminathan, 1995; Mowery, Oxley & Silverman., 1996; Nishiguchi, 1994; Nishiguchi & Ikeda, 1996; Petersen, Handfield & Ragatz., 2003, 2005; Rolstadas, 1995; Sakakibara, 1997; Shenas & Derakhshan, 1994; Song & Parry, 1997; Swink, Sandvig & Mabert, 1996).

Information from supplier is important in the NPD process (Culley, Boston & McMahon, 1999). Supplier is viewed as the information provider. Suppliers possess valuable information and expertise in the product development process. Thus, frequent communication and informal discussion held with suppliers can help firms facilitate new ideas and information. By sharing expertise regarding technology from suppliers, firms would have better solutions to their existing problems (Ragatz, Handfield & Petersen, 2002). This is because suppliers can provide valuable information about materials, pricing, and process capability. Suppliers can also provide useful suggestions for any

changes in design and material choices that will result in efficient operation, higher quality and reduced time to market (Vayvay & Cobanoglu, 2006). Extensive communications with manufacturers and suppliers can help facilitate firms to figure out what sort of inventions or improvements that could be implemented. All of these can create new opportunities and new knowledge which could lead to innovations (Chung & Kim, 2003). However, those studies have neglected to investigate the moderating effect of supplier involvement on the relationship between market orientation and proficiency of NPD. Therefore this study intends to fill this gap. The following section describes gap of the study.

1.2 Gaps in this study

To the current study, few gaps have been identified. First, as has been discussed earlier, many studies have been undertaken to investigate the relationship between market orientation and new product performance, but majority of them have viewed market orientation as a culture such as that conceptualized by Narver and Slater (1990). Based on extensive literature reviews this study found that few studies have viewed market orientation as market information processing that can enhance new product performance in new product development.

Second, many previous studies have shown the strong relationship between market orientation and new product performance, and there should be a mediating variable between the relationships (Baker & Sinkula, 2005). In the same way, Sanvik (2003) did suggest that market orientation is most effectively studied through the use of mediating variables that tapped on how market orientation works. In addition to that, Langerak et al. (2004) suggested that there is a link between market orientation and new product performance. They have studied the proficiency of predevelopment activities

(strategic planning, idea generation, and business analysis) as mediating variables in the relationship between market orientation and new product performance, and found that the market orientation has an indirect effect on new product performance through proficiency of strategic planning and idea generation. Moreover, they have suggested that there is a need to investigate the role of proficiency of the NPD in all stages in the relationship between market orientation and new product performance.

Third, the discussion on previous studies viewed market orientation as an important predictor of proficiency in NPD and supplier's involvement also was highlighted as an important of NPD, but limited studies have tested on how supplier's involvement can strengthen the relationship between market orientation and proficiency of the NPD.

Therefore, this study aims to investigate the relationship between market orientation dimensions and new product performance by introducing a mediating factor, proficiency in NPD. Furthermore the contribution of this study is to investigate the role of supplier involvement as a moderating effect between market orientation dimensions and proficiency in NPD.

1.3 Problem Statement

New Product Development (NPD) process involves major risks due to unknown or unforeseen obstacles in terms of technology and business risks. At the same time, it is difficult to understand customer's needs and preferences and to balance them with capabilities of the firm to produce a product that satisfies the customer and give a better advantage to the firm against its competitors. This especially true in the electrical and electronics industry where technology changes rapidly such that product life-cycle becomes shorter. Some good examples of such products are the laptop computers which usually become outdated within three months, notebook computers in five months, hard

disk in six months, and monitors in a year (Poapongsakorn & Tangkitvanich, 2003). Moreover, the increase in demand and intense competition make firms continuously struggle to increase their capabilities to understand customer needs and preferences to produce products that satisfy their customers and placing them at a better position than their competitors' products.

According to the dynamic capabilities theory, which is an extension of the resource based view theory (RBV) such as how resources are developed, how they are integrated within the firm and how they are released that is dynamic capabilities acting as a buffer between firm resources and the changing business environment. Dynamic resources help a firm adjust its resource mix and thereby maintain the sustainability of the firm's competitive advantage, which otherwise might be quickly eroded. So, while the RBV emphasizes resource choice, or the selecting of appropriate resources, dynamic capabilities emphasize resource development and renewal. The key implication of dynamic capabilities, it refers to the firms' abilities to adapt, integrate, and reconfigure their internal and external organization skills, resource, and functional competency to match the requirements of a constantly changing environment (Teece& Pisano, 1997). In addition, market orientation increases the ability to develop organizational capabilities to understand, process, and use market information (Kohli and Jaworski, 1990).

Market orientation is divided into three dimensions: (1) the generation of market information which constitutes the collection and assessment of customer needs, customer preferences, market environmental factors done through customer visits, market study and market research, (2) the dissemination of market information, which consists of all market information after their generation, then it must be distributed

internally by means of transferring and sharing effectively, information between every department in the firm, and (3) ultimately responding to the market information by reacting to market information in the form of improved product design and new product development.

Market orientation as information processing capabilities contributing to new product performance was highlighted by scholars such as Atuahene-Gima (1995); Baker and Sinkula (2005); Gresham (2006); Sandvik, (2003); Sherman, Souder & Jenssen (2000); Vazquez, Santos & Alvarez (2001); Veldhuizen et al. (2006); Wei and Morgan (2004); and Wren & Souder (2000); Furthermore, previous studies have addressed the importance of proficiency of the NPD in enhancing new product performances (Cooper & Kleinschmidt, 2004; Ledwith, 2000; Nukhet & Calantone, 2009; Ozer, 2006; Rochford & Rudelius, 1997; Song, Souder & Dyer 1997).

In reference to the dynamic capability theory, some researchers have suggested that market orientation is the firm's capability that enhances proficiency of the NPD (Wei, 2006). Hence, NPD is then looked upon as a process that requires the capabilities to obtain, process, and interpret large amounts of market, technical, financial, and other information for the firm to develop product ideas, technical evaluation, manufacturability, and economic feasibility (Gome, 2003).

Even though previous studies had revealed the significance of a positive relationship between market orientation as market information processing system could positively contribute to the proficiency of NPD. Nevertheless, the details of relationship between market orientation as information processing subsystem (intelligence generation, intelligence dissemination and responsiveness of market intelligence) and

new product performance are still lacking (Carbonell, 2010; Procter, Souchon & Cadogan, 2000; Sanvik, 2003).

In addition to that, this study views the supplier's involvement as an external resource that can be internalized within the organizational capability as a form of market orientation to enhance proficiency of the NPD. This means that the supplier's involvement in NPD can help firms to enhance their proficiency in their NPD.

However, empirical studies done on supplier involvement in NPD gave mix results. There had been studies that showed that the supplier's involvement has a significant effect on the NPD (Bonaccorsi & Lipparini, 1994; Chung & Kim, 2003; Clark, 1989; Fujimoto et al., 1996; Martin et al., 1995; Mowery et al., 1996; Nishiguchi, 1994; Nishiguchi & Ikeda, 1996; Petersen et al. 2003, 2005; Rolstadas, 1995; Sakakibara, 1997; Shenas & Derakhshan, 1994; Song & Parry, 1997; Swink et al., 1996). There are also studies indicating the negative effects of the supplier's involvement in the NPD such as projects being delayed (Laseter & Ramdas, 2002; Eisenhardt & Tabrizi, 1995; Monczka, Trent & Handfield, 1999). For the mixed result, there is a need to analyze supplier involvement in the NPD process in a comprehensive way (Danese & Filippini, 2010). Atuahene-Gima, (2006) argues that to further understand NPD, supplier involvement as providing the moderator effect needs to be examines. In this study supplier involvement was found to act as the moderator effect on the market orientation dimensions and proficiency of NPD. Thus, supplier involvement is important to enhance the efficiencey of the NPD process in the context of Thailand electronics and electrical industry (Suwannapirom & Lertputtarak, 2008).

According to extensive literature review there have been little previous studies that had systematically examined the moderator effects of a supplier's involvement in

the relationship between individual dimensions of market orientation (intelligence generation, intelligence dissemination, and responsiveness of the market intelligence) and proficiency of the NPD. Given the scenario of this background, this research attempts to determine how market orientation dimensions could contribute to new product performance and how these relationships can be mediated by the proficiency of the NPD. The supplier's involvement in moderating the relationships between market orientation dimensions and proficiency of the NPD shall also be investigated in this study.

1.4 Research Question

Based on the background of the study, gap of the study and the research problems, this study attempts to answer the following questions:

1. What are the relationships between market orientation dimensions and new product performance?
2. What are the relationships between market orientation dimensions and proficiency of NPD process?
3. What are the relationships between proficiency of the NPD process and new product performance?
4. What are the mediation impact of proficiency of NPD in the relationships between market orientation dimensions and new product performance?
5. What are the moderating effect of supplier involvement on relationships between market orientation dimensions and proficiency of the NPD process?

1.5 Research Objectives

To answer the research questions, the study objectives are set as follows:

1. To investigate the relationships between market orientation dimensions and new product performance.
2. To investigate the relationships between market orientation dimensions and proficiency in NPD process.
3. To investigate the relationships between proficiency in NPD and new product performance.
4. To investigate the mediation effect of proficiency in NPD in the relationships between market orientation dimensions and new product performance.
5. To investigate the moderating effect of supplier involvement in the relationships between market orientation dimensions and proficiency in NPD process.

1.6 Scope of the Study

This study will focus on Thailand's electrical and electronics manufacturing firms that have R&D or product development department and marketing department. That is data were obtained from marketing managers and R&D managers as well as the company's senior management who are responsible for NPD. This study examines factors that influence new product performance. The independent is on market orientation with consisting of three dimensions, generation of market intelligence, dissemination of market intelligence and responsiveness to of market intelligence. Meanwhile, proficiency of the NPD with consisting of five processes, idea development and initial screening, business and market opportunity analysis, technical development, product

testing and product commercialization are conceptualized as a mediating variable and the supplier's involvement as the moderating variable.

1.7 Significance of the study

There are two main contributions of this study which can be classified as the theoretical contribution and the practical contribution.

In terms of theoretical significance, this study intends to contribute to the existing literature by addressing three issues. First, an extensive study in market orientation and new product performance had conceptualized market orientation as a culture, consisting of three dimensions, customer orientation, competitor orientation, and inter-functional integration that follows Narver & Slater's (1990) perspective. There are very few studies that conceptualized market orientation as behaviour consisting of three dimensions, that is, generation, dissemination, and responsiveness to market intelligence that followed Kohli & Jaworski (1990). Most of the studies measured market orientation by combining three dimensions of market orientation into single dimension. For this study it tries to view the market orientation (MO) as market information processing system and measure market orientation in its separate dimensions. Second, based on the extensive literature, there has been little research that studied market orientation in its individual dimension (generation of market intelligence, dissemination of market intelligence, and responsiveness to market intelligence) through various NPD stages, which starts from idea development until product commercialization. Third, to investigate the effects of supplier involvement in the relationship between market orientation and the proficiency in NPD, as such investigations were not conducted prior to this study.

In terms of practical contribution, this study is being conducted in a developing country like Thailand which can generate new ideas from the perspective of an Asian developing country. This is important because most of the studies concerning NPD had been conducted in western developed countries, as well as some developed country in the Asian region such as Japan, Korea, and Taiwan

So, the results reported in this study can be used to formulate strategies for new products based on the study's variables, which would be relevant to developing countries, such as market orientation (generation of market intelligence, dissemination of market intelligence and responsiveness to market intelligence), proficiency of the NPD, and supplier's involvement which could influence new product performance.

1.8 Definition of Key Terms

There are several key terms mentioned in this study and are defined as follows:

1.8.1 **Market orientation** is defined as the process of implementing marketing concepts consisting of 3 behaviours (1) generation of market intelligence, (2) dissemination of market intelligence, and (3) responsiveness to market intelligence (Kohli & Jaworsaki, 1990).

1.8.2 **Proficiency in NPD** process is defined as how well the tasks of NPD process (Millson & Wilemon, 2002). In this study NPD process contains the stage of: idea development and initial screening, business and market opportunity analysis, technical development, product testing, and product commercialization.

1.8.3 **New product performance** is defined as the degree to which a product met a firm's market shares, sales, profitability, and ROI objectives during the first twelve months of its life in the market place (Griffin & Page, 1996).

1.8.4 **New product** is defined as product that is not manufactured and launched to the market by a company (Owens, 2004).

1.8.5 **Supplier involvement** is defined as the degree of involvement from supplier in new product development (Song & Benedetto, 2007)

1.8.6 **New product concept** is a brief statement of the description of the new product that explains the product which a manufacturer intends to make, and describes the product attributes, benefits, and values to customers (Ishino, et al., 2000).

1.8.7 **Prototype** is defined as part of the product designing process which allows engineers and designers to show their ability in exploring design alternatives, to test theories and confirming performances prior to starting production of a new product (Wikipedia, 2009).

1.9 Organization of the thesis

This study consists of five chapters. The first chapter presents the background of the study that reviews the significant contribution of Thailand's electronics and electrical industry, the study problem was highlighted, followed by a discussion of the objectives, significance, scope of the study, and definition of key terms.

Chapter Two accounts literatures reviewed on the theoretical background, definition of a new product, determinants of new product performance, market orientation, NPD model, proficiency of NPD, supplier involvement which constitute

variables in this study. In addition, the conceptual framework of the research and research hypotheses were also described in this chapter.

Chapter Three explains the research methodology which includes a discussion of the research design, sampling design, data collection procedure, questionnaire design, variables and measurement, and statistical analysis.

Chapter Four elucidates on the data analysis and findings. It begins with information on response rate and profile of responding firms. This is followed by assessing goodness of measures, descriptive statistic, correlation analysis, multiple regression analysis, and hierarchical regression analysis that were used to test the research hypotheses.

Chapter Five provides the discussion of the findings and conclusion of the study. It begins by a brief recapitulation of the study, followed by the discussion on the findings and an explanation of the theoretical and practical contribution of this thesis. Finally, a clarification of the limitations of the study, suggestions for the future research and the conclusions are also included.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

Chapter 2 provides the background of electronics and electrical industry in Thailand. Then it follows the discussion on the determinants of new product performance, the elaboration of the various concepts used in this study such as MO, NPD, the proficiency of NPD, and the supplier involvement in NPD. Finally, the theoretical background of this study and the relationships between the related variables in the study

2.1 The Situation of Electrical and Electronics Industry in Thailand

The electronics and electrical sector was chosen in this study because it is the most active in product innovation. In addition, it is the largest industrial export sector and has been leading the export growth of the country over the past two decades. It is also likely to continue to be important to Thailand's future international trade. The target set by the Federation of Thailand industry for the electrical and electronics industry is that by the year 2010 its export is to grow to USD50 billion. In 2009, Thailand's overall trade in electrical appliances and electronics (E&E) was worth approximately USD38 billion or 60% of Thailand's total export revenues (Board of Investment Thailand, 2009). The leading products are computers, air conditioners, refrigerators, and television sets. In addition, as regards to global exporter ranking, Thailand was ranked the largest out of 22 manufacturers from around the world, the world's second-biggest maker of air conditioners, and fourth largest for manufacturing refrigerators. Moreover, Thailand was ranked as the largest hub for the production of electrical appliances industry in ASEAN (Sopadang & Yaibuathet, 2010). Currently, Thailand is ranked the largest

producer of electronics goods in the world producing 1.4 million units per year. The main electronics export were hard disk drives (HDD) and integrated circuits (IC) which accounted for approximately 54% and 29% of the total electronics exports respectively. Figure 1.1 shows the proportions of electrical appliances and electronics exports from 2003 to 2008 that electronics have larger proportions of export than electrical appliances.

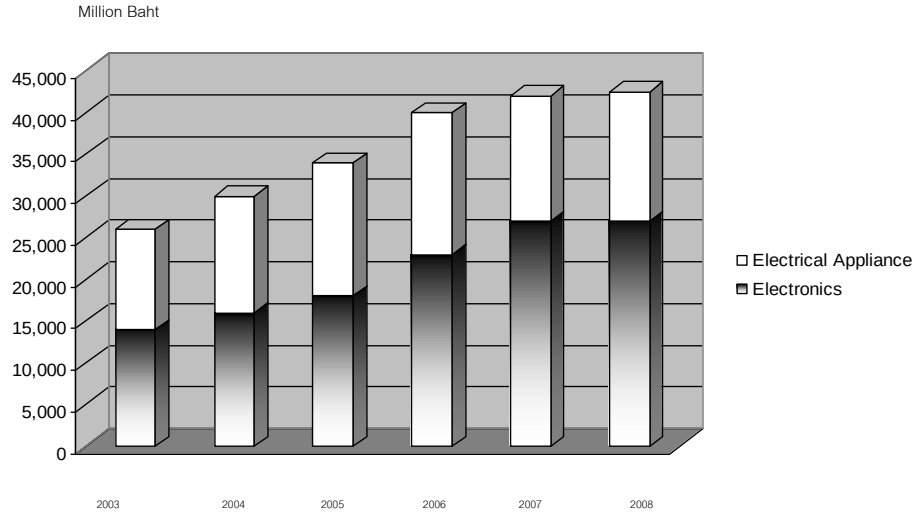

Figure 2.1. Thailand's Electrical and Electronics Industry Export from 2003 – 2008
Source: Thai Electrical and Electronics Institute, 2009

According to the Electrical and Electronics Institute (EEI) statistical survey done in 2007, 62% of electrical firms were wholly owned by Thai nationals, 23% of firms were joint ventures, and 14% of firms were wholly owned by foreigners. As for the electronics firms, 45% of firms were wholly owned by locals, 27% of the firms were joint ventures, and 28% of the firms were wholly owned by foreigners. Thus, in terms of the ownership structure, in both the electronics and electrical industry, most of the firms are wholly owned by Thai nationals.

Several studies conducted on Thai firms since the 1980s show that most firms have grown, but they were not able to deepen their technological capabilities in the long run. Their technological learning has been very slow and passive (Bell & Scott-Kemis,

1985; Chantramonklasri, 1985; Dahlman & Brimble, 1990; Hobday & Rush, 2007; Intarakumnerd et al., 2002; Lall, 1998; Mukdapitak, 1994; Rasiah, 2003; TDRI, 1989; Tiralap, 1990; Yokakul & Zawdie, 2010).

The R&D/Innovation 2003 survey on Thai manufacturing firms found that technological innovation undertaken by Thailand's firms were below average with only (6%) compared with the E.U. (44%), Korea (43%), and Malaysia (42%). Meanwhile, the number of firms that undertook innovations and R&D accounted for only 20% and 15% respectively. Furthermore, about half of the sample firms (48%) that conducted product or process innovation did not have a formal R&D department. However, some large Thai firms have implemented in-house R&D, but their technological capabilities were still insufficient (IMD, 2010; Intarakumnerd, 2002).

International Institute for Management Development (IMD, 2007) survey on R&D expenditures and GDPs found that Thai R&D expenditure was below global average (0.7%) with only 0.21 % of its GDP, compared with Malaysia (0.63), China (1.49), Singapore (2.36), Taiwan (2.62), and South Korea (3.47). This implies that the R&D activities in Thailand are fewer when compared with other countries.

According to the World Bank Report, 2006, the number of patent per 100,000 population in Thailand from the year 2001 to 2004 was 0.03, while for Malaysia it was 0.07; Korea, 0.28; Hong Kong, 8.67; Singapore, 9.32; China, 9.87; and in Taiwan it was 30.17. The Intellectual Property Department of Thailand reported that in 2007, the number of patent applications was only 60 product items. This implies that product innovation in Thailand was very low compared with other countries.

The electronics industry is one of Thailand's largest in the manufacturing sector. It comprised largely of electronic parts (40%), computers and peripherals (34%), consumer electronics (15%), electronic household appliances (6%), and telecommunication and office equipments (4%) (UNCTAD, 2005). Indeed, there is no doubt that strong support from the Thai government, as shown in Table 1.1, has enabled the Thai electronics industry to compete internationally. This industry has continued to gain more benefits and incentives from the Board of Investment (BOI). For example, BOI has granted 219 projects in electronics and electrical appliances industry worth around USD3 billion in 2009. These projects focused on manufacturing HDD, memory storage equipment, digital cameras, automobile electronics, and other electronic products.

Furthermore, BOI has introduced new incentives in Science and Technology (SIT) Action Plan (2003 – 2013) for the electronics industry. Firms engaging in R&D to develop their scientific and technological capacity, spending at least 1 – 2% of their sales, will receive tax incentives. For example, a company specializing in electronic design can be exempted from import duties for importing machinery, raw materials, and components, used for producing electronic goods. These incentives would encourage firms to implement new or improved products and processes, particularly in knowledge based industries such as RFID, LED, and LCD.

The number of government strategies and policies promoting product development is shown in Table 1.1 and the intellectual property rights (IPRs) for protecting electronics product in Thailand is shown in Table 2.1.

Table 2.1

Thai Government's Key Strategies and Policies Promoting Product Development

Year	Description
1986	Established the National electronics and computer technology centre (NECTEC), the purpose of which is to conduct and support research, development, design, and engineering in science and technology.
1988	Established Electric and Electrical Institutes (E&E), the purpose was to encourage and support the development of local electrical and electronic products standards in accordance with international standards, to encourage the export of electrical and electronic products, and to be a centre of information for the study, R&D of electrical and electronic products and equipment.
1991	National Economic and Social Development Plans (NESDPs) In the fifth plan, the objective is to develop scientfic and technological capabilities.The policies focused on increasing production efficiency, to develop capabilities to modify and upgrade technologies, to develop novel technological products, and to increase R&D performance. The sixth plan focused on promoting cooperation between government agencies in R&D, to improve the linkages between R&D institutions and industry, to set up effective S&T management systems, to develop the S&T infrastructure, to increase the efficiency of production, and science and technology activities, and to develop science and technology manpower. For instance, to promote investment in manufacturing high technology products, to support industries in terms of product design which include specific products as personal computers and mobile phones by identifying key technologies as the computer aided and mechanical technology, software engineering, circuit designs, and production management technologies.
1997	Established the Software Park Thailand, the purpose was to promote innovation andfacilitate development of start up firms. To encourage technology transfer and knowledge flows within firms in the Park and outside tenants, NSTDA, participating universities, and TNCs. Established the Software, Microchip, and Electronics Cluster. The purpose was to enhance the competitiveness of local industry, increase the local content of assembled products, and promote design and product development capabilities.
2004	Established Thailand IC Design Incubator (TIDI) to promote semiconductor designing capabilities, and providing training and certification of IC layout designers. It is hoped that it will attract IC designers from abroad and help bring together different players in the semiconductor subsector (industry, universities and public institutions) to collaborate or enter into strategic alliances to promote knowledge exchange. This may encourage innovation, skills development and the creation of stronger linkages and greater trust.
2006	Established HDD Technology Training Institute, the purpose was to supply highly qualified technical staff to the local industry. HDD cluster development project is expected to develop and implement several projects to address the needs of the HDD subsector. The project seeks to make the subsector competitive, increase the local content of assembled products, and promote design and product development capabilities.

Source: *United Nations Conference on Trade and Development (UNCTD, 2005)*

Table 2.2
Intellectual Property Rights (IPRs) Protecting Electronics Industry

Year	Description
1992	The patent law was reformed to provide wider protection for inventions, and in 1999, the patent law was amended again.
1995	Revised its Copyright Act and ratified the Berne Convention and copyright protection was implemented under TRIPS Agreement in 2001.
2000	Introduced legislation for protection of integrated circuit designs, resulting from rearrangement of standard components. The legislation aims to protect novel circuit designs or new design.
2003	Introduced protection of trade secrets legislation against the illegal production of optical disks (CDs, CVDs, and DVDs).

Source: United Nations Conference on Trade and Development (UNCTD, 2005)

Furthermore, even if Thai government has provided proactive support to the electronics industry, in terms of Thailand's electronics competitiveness, the industry faces tough competition especially from emerging economies such as China, Malaysia, and Singapore (Thailand Business News, 2010). In addition, the success of the electronics industry depends on their engagement in R&D, while emphasizing on innovative product design and new product development (Beat & Rasiah, 2003). To prepare this industry to gain competitive advantage, the Thai electronics manufacturers need to invest more in new technology products, and invest more of their funds in training their human resources, especially at the level of engineers and technicians, as this will allow them to acquire the ability to add more value through improvement of their product design, new product development, and conducting research and development (Doner et al., 2010; Hobday & Rush, 2007; Machikita et al., 2009, Nipon & Somkiat, 2000).

Before presenting the literature on relationships between the related variables in the current study we will present the definitions of new product, the determinant of new product success**,** the NPD process and the supplier involvement in NPD.